

Questions 8: Game Theory

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Question 1

Suppose of you have a choice between two lotteries A and B:

- Lottery A: The utility can have values -1, 0 or 1.
- Lottery B: The utility can have values -2, 0 or 2.

Suppose that all values have equal probabilities.

- a) What choice does the maximum expected utility principle suggest?
- b) Which of the lotteries has higher uncertainty (risk)?

Question 2

Describe what is a payoff matrix in a zero-sum 2-person game. Give example.

Question 3

What is a mixed strategy? What is an optimal mixed strategy?

Question 4

Suppose that players A and B play the Rock Paper Scissors game (paper wins over rock, scissors win over paper, rock wins over scissors, and draw for any matching pair). Denote by $S^A = S^B = \{r, p, s\}$ the sets of strategies for both players in each game, which correspond to rock, paper and scissors respectively. Suppose that player A uses mixed strategy $P^A = \{0.1, 0.2, 0.7\}$, where each number is the probability of rock, paper or scissors respectively. Suggest a winning mixed strategy for player B . Use the expected payoff to prove that the strategy is winning.